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FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. 84-05

3430 Evaluation
January 24, 1984

AN EVALUATION OF PEST CONDITIONS IN RANCHERIA CAMPGROUND, PINERIDGE RANGER DISTRICT, SIERRA NATIONAL FOREST

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ABSTRACT

Information on pest conditions was collected in Rancheria Campground for use in a vegetation management plan. The major pests detected included mountain pine beetle and dwarf mistletoe on lodgepole pine and Fomes annosus in true fir. Other factors contributing to tree mortality, both present and expected, included overstocking and water drainage problems. Methods to alleviate each of these pests or conditions are addressed.

INTRODUCTION

In August, 1983, Forest Pest Management (FPM) personnel completed a biological evaluation of Rancheria Campground on the Pineridge Ranger District. Objectives of the evaluation were to gather information on pests present in the campground and to provide management alternatives that could be incorporated into vegetation management plans for the recreation site. Coordination between FPM and the Sierra National Forest was done through Mark Smith, Forest Silviculturist.

This campground has 158 units and is located on the east end of Huntington Lake at an elevation of about 7,000 feet. Maintaining vigorous uneven-aged stands made up of the existing tree species is a management objective for the campground. The vegetation management plan identifies four stands (a, c, d, e) within the campground boundaries (see map, page 7). Stand "a" is three-layered, containing lodgepole pine, white fir, and red fir and includes about 80% of the campsites. Stand "c" also contains three layers but has more old-growth true fir and less lodgepole pine. It includes almost all of the remaining campsites. Stand

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"e" follows a stringer meadow. The central area is open, grassy, and includes a stream while the edges are wet and timbered with sapling through sawtimber size lodgepole pine and true fir. Stand "d" parallels the meadow along the side and top of a rocky ridge. It has three layers of scattered Jeffrey pine, lodgepole pine, and true fir.

PEST OBSERVATIONS AND DISCUSSION

Lodgepole pine

Most of the dead lodgepole pine in the campground had been attacked by the mountain pine beetle (Dendroctonus ponderosae). (The biology of each pest mentioned has already been described in two previous reports sent to the Forest, namely 1) 1920 Land and Resource Management Planning, February 26, 1981, Forest Pest Information for Huntington Lake Recreation Area Planning, and 2) 3430 Evaluation, August 10, 1981, An Evaluation of Existing and Potential Forest Disease and Insect Problems in the Catavee and Kinnikinnick Campgrounds, Pineridge Ranger District, Sierra National Forest.) Tree mortality typically occurred in groups containing standing dead trees, green infested trees and stumps. At Site 1, for example, there were six dead standing pines, three green infested pines and several stumps. The basal area at this mortality group was 280 sq.ft./acre (not including the stumps of recently removed trees) in addition to the seedlings present. Another bark beetle group-kill of lodgepole pine at Site 124 had a basal area over 340. The presence of stumps, recently abandoned trees, and currently infested trees indicate that the mountain pine beetle has been active in dense pine aggregations the past few years and is currently active.

Successful pine bark beetle attacks often indicate that trees are under stress from other causes. Three such stress-causing factors we found in Rancheria Campground included overstocking, excessive soil moisture and dwarf mistletoe infections.

The distribution of vegetation in the campground varies greatly from open areas to areas with very dense tree aggregations. The inter-tree competition in densely stocked areas, in combination with overmature lodgepole pine, creates conditions favorable for successful bark bettle attacks.

A consistently high water table or a change in drainage patterns that results in standing water, can reduce tree vigor and cause mortality regardless of stocking densities. Several streams run through the campground; there are many moist locations and others that are flooded. In most cases abundant soil moisture accounts for the plentiful vegetation at Rancheria, but in other cases excessive moisture is killing trees. Examples include standing water with dead/dying lodgepole pine and white fir between Sites 25 and 27 and at Sites 20, 79 and 82.

Dwarf mistletoe (Arceuthobium americanum) was found on lodgepole pines of all ages throughout the campground. At moderate and severe levels of infection, this parasite reduces growth and vigor, making trees likely

candidates for bark beetles attacks. Because this parasite spreads via forcibly ejected seeds, infected overstory trees provide a continuous source of new infections on understory trees.

Leaving infected dominant trees is not compatible with trying to perpetuate an uneven-aged stand. In other words, with the present dwarf mistletoe situation at Rancheria, it is nearly impossible to maintain both a healthy lodgepole pine overstory and understory for any long period.

In summary, many lodgepole pines, especially in the overstory, are not healthy, as evidenced by their thin and/or chlorotic crowns. Saturated soils, moderate-to-severe dwarf mistletoe infections, and overstocking are the principal reasons for the unhealthy state of these trees, and in this condition they are, and will continue to be, prone to successful mountain pine beetle attacks.

White Fir

The most significant pest affecting white fir is annosus root disease, caused by the fungus Fomes annosus. Infection centers were found in stands a_1, a_2, c_1 and d. The distribution of this root rot, however, is more closely associated with sites that support old-growth fir, rather than with general stand types. All of the confirmed root disease centers are shown on the enclosed campground map. Our methods for detecting root disease are conservative and undoubtedly underestimate the actual number and extent of centers.

This root disease may kill slow-growing or small firs outright, but more likely it will decay the support roots and butt log of firs leading to potential root failure. White fir near disease centers that have ragged or thin crowns with numerous dead branches and/or tops are probably infected and should be monitored closely. Knowing that a specific site has annosus root disease will be an important factor in prescribing silvicultural activities for that area.

Jeffrey Pine

Jeffrey pine are very sparsely distributed within Rancheria and are mainly old-growth dominant trees. Although we found one recently killed 36" dbh tree infested with the Jeffrey pine beetle (Site 63), these pines are relatively pest-free. They are resistant to lodgepole pine dwarf mistletoe, are not likely to be infected by Fomes annosus under the conditions in the campground, and are not hosts of the mountain pine beetle. However, the same conditions that lead to mountain pine beetle problems of lodgepole pine, especially overstocking, can cause bark beetle mortality of Jeffrey pine.

MANAGEMENT ALTERNATIVES

1. No change in management. Current management includes the removal of hazard trees, windfall, and pest-killed trees. The following statements were taken from the campground vegetation management plan and describe what the future vegetation is expected to be under existing direction.

Upper layer: "Gradually the older mature lodgepole pine will drop out of the upper layer in all four stands. The old mature white and red fir and some Jeffrey pine will also be reduced."

Middle layer: "The portions of the middle layer that are overstocked will compete for water and light leaving the dominant vigorous trees to replace the older trees in the upper layer. The uneven aged appearance may be somewhat maintained but could end up in a less uneven aged fir or lodgepole pine stand."

Bottom layer: "The overstocked portions of the bottom layer will continue as is. Since these areas are under stress, insect and disease could cause unwanted mortality and reduce this layer. In other words, nature may reduce the overstocked conditions but not like it should be done."

All layers: "Holes will be created as the insect and mistletoe infected trees die and are removed."

From a pest management standpoint we surely agree with each of these statements, but would add that the predicted changes could take place more abruptly and be more severe than the plan anticipates. Under current management, annual tree mortality will continue or could accelerate if weather-related stress factors such as drought or flooding became severe. We feel that without active vegetation management the campground stands will not remain uneven-aged and will definitely shift toward true fir.

2. Thin overstocked aggregations. This general treatment has already been prescribed for densely stocked portions of the campground. Thinning in recreation areas can help to increase tree vigor. Residual trees are often more resistant to bark beetles and may outgrow dwarf mistletoe effects providing there are no sources of mistletoe seeds in the overstory. Thinning dense groups of seedlings and saplings will foster full-crowned trees with good screening characteristics.

The approach used in thinning will depend upon each specific situation. Poles and larger trees may be thinned by reducing basal areas to a predetermined level or by using spacing criteria. Seedlings and saplings are usually best regulated by spacing guides. If pests such as dwarf mistletoe are present, thinning guidelines should discriminate against the most severely infected individuals. Finally, thickets of small trees can be removed from around highly desired, but stressed, overstory trees.

3. Reduce dwarf mistletoe impact. As stated earlier, when dwarf mistletoe is well established in all levels of a stand, it is not possible to maintain both a healthy overstory and understory. When retaining an overstory of lodgepole pine is the highest priority, as many dwarf mistletoe infections as possible should be pruned out. This pruning should not be done, however, if it will leave less than 30% live crown. In this case removing just witches' brooms would be the preferred treatment and would at least prolong the tree's life. If overstory infections remain after pruning, understory lodgepole pine will continue to get new infections. It would be best to favor resistant white fir and/or Jeffrey pine if present.

Where a lodgepole pine understory is desired, all mistletoe infections should be removed from the overstory, either by pruning or tree removal. The understory may then be released by taking out the most heavily infected trees and maintaining a mixture of lodgepole pine, true fir, and Jeffrey pine.

A single method of dwarf mistletoe control will not be appropriate for the entire campground; site by site treatment decisions will have to be made. The overall level of dwarf mistletoe infection in stands may be reduced by removing infected trees during routine sanitation and TSI work. Dwarf mistletoe should certainly be an important consideration in planning these activities, but the benefits gained will be short-term because the mistletoe will eventually build up to original levels. Long-term benefits could be derived from a thorough and aggressive suppression project. The District should contact Forest Pest Management if they would like more detailed information on dwarf mistletoe suppression and possible FPM funding.

4. Reduce Fomes annosus impact. Once annosus root disease is established in a stand it is almost impossible to eradicate. There are steps, however, that can help to lessen the effects of this root disease on the campground.

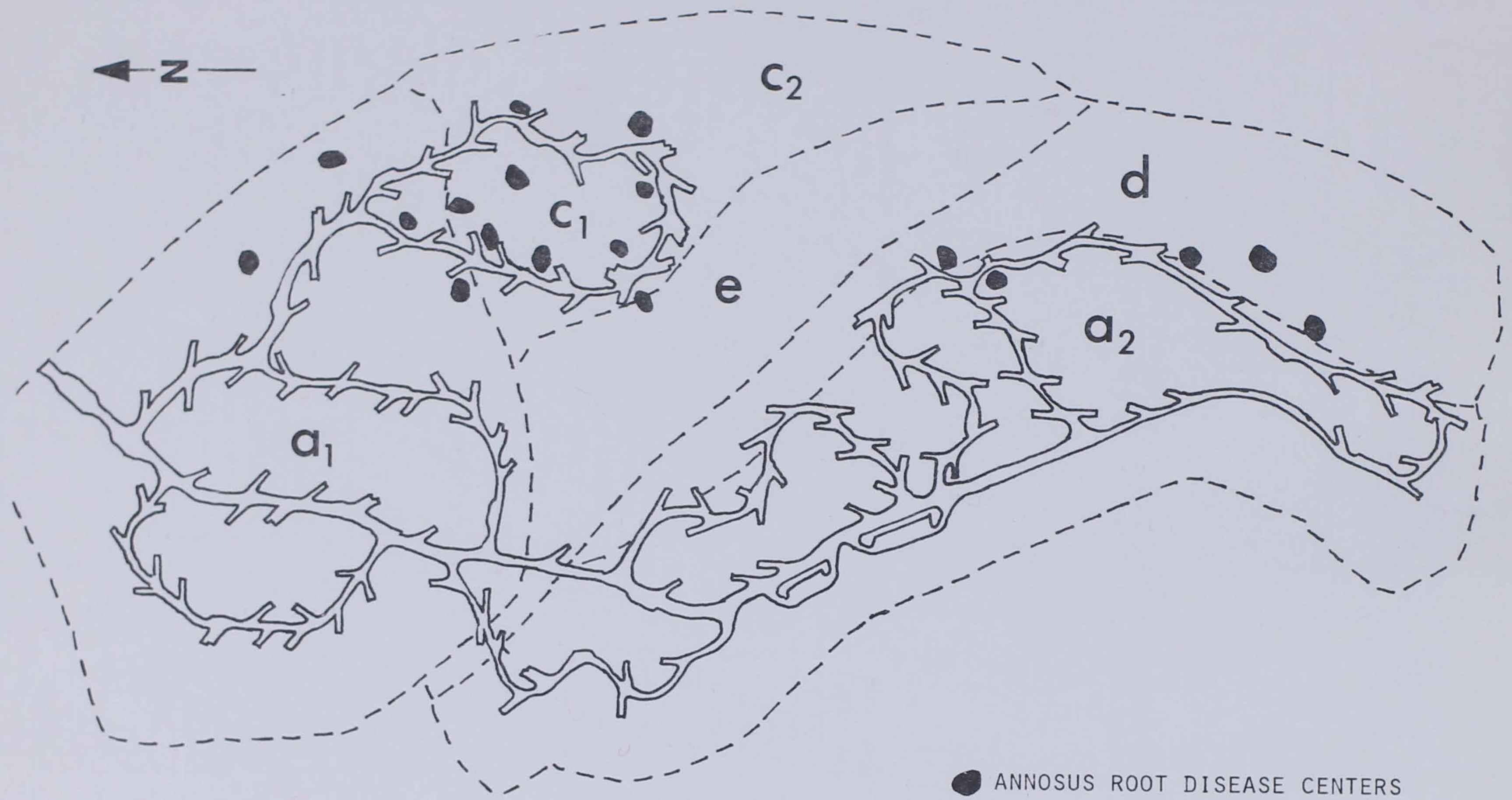
a) Prevent new infection. Applying borax to freshly cut conifer stump tops will prevent most new infections, but will not have any effect on established disease centers. This treatment is required on all conifer stumps created in and near developed recreation sites (FSM 2303 R-5 Supp No. 126 and 2331.33 R-5 Supp No. 90).

b) Stump and root removal. Fomes annosus will remain viable in root systems until they are decomposed, and as long as inoculum remains in the soil, true fir regeneration will not survive within these disease centers. Removing infected stumps and roots would help to reduce the underground spread of the fungus. Recently cut stumps could be pulled out, but decayed stumps would have to be dug out or completely burned. The effectiveness of this method increases with the amount of root material removed. As yet, stump and root removal has not been demonstrated to be an effective control either experimentally or operationally in California. If the District chose this alternative, FPM would like to assist in implementing and monitoring the treatment.

5. Favor hardwoods and non-host conifers. Planting suitable hardwoods and favoring those already present can help reduce the impact of several pests active in Rancheria. Hardwoods are resistant to Fomes annosus and will survive in disease centers and establish a barrier of non-susceptible roots that can reduce further underground spread. Also, when interspersed with conifers their crowns will block the spread of dwarf mistletoe. Finally, they are not susceptible to the insects causing conifer mortality in the campground. Because annosus root disease is confined to true fir in the campground, Jeffrey and lodgepole pine would also survive in annosus root disease centers. As mentioned earlier, neither true fir nor Jeffrey pine are susceptible to lodgepole pine dwarf mistletoe.

6. Correct drainage problems. The only way to avoid additional tree mortality in areas with standing water is to alter the drainage patterns and remove excess water. Methods required may include ditching, installing culverts and/or drainage tiles.

Any or all of alternatives 2-6 may be viable for specific locations within the campground. Under the principles of integrated pest management, the District will need to assess pests and alternatives on a site by site basis and determine what action is most appropriate to meet their objectives.



SIERRA NATIONAL FOREST **Rancheria Campground**